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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,188	02/08/2002	Tomoaki Yoshida	Q63028	8127

23373 7590 01/29/2009

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EXAMINER	
CANTELMO, GREGG	
ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
01/29/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/049,188	YOSHIDA ET AL.	
	Examiner	Art Unit	
	Gregg Cantelmo	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2008 and 20 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,17-22 and 27-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,17-22 and 27-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/31/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 18, 2008 has been entered.

Response to Amendment

2. In response to the amendment received October 20, 2008 as per the RCE filed November 18, 2008:

a. Claims 1, 17-22 and 27-30 are pending.

b. The previous rejections of claims 1 and 28 have been withdrawn in light of the amendment. New grounds of rejection to these claims are presented herein, in response to the amendment of the claims

c. The remaining prior art rejections of record stand in light of the amendment.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 28 contains the trademark/trade name VGCF. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe a vapor grown carbon fiber and, accordingly, the identification/description is indefinite.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 17, 18, 21, 22, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 07-230811A (JP '811).

This rejection relies upon the IPDL machine translation of JP 07-230811, a copy of which has been made of record.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the fuel cell of claim 1 and the membrane electrode assembly of claims 17, 21 and 22, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and paragraphs 7-13). Each of the catalyst/gas diffusion configurations are applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes wherein each electrode includes the gas diffusion layer and catalyst layer as described in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12). The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, are anticipatory for this limit. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art. The mixture of the PTFE to carbon whiskers is from 5-40% by weight, preferably 10-30% by weight (see paragraph 10) such weight relationships inherently fall in the broadly claimed range of 1-95% mass as required in claim 22).

Regarding the heat treatment of at least 2000^{o}C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

The catalyst material is a mixture of platinum group catalyst and a carbon black support (see paragraph 12). Thus the surface of the gas diffusion layer in contact with the platinum catalyst material is also in contact with the carbon black support (as applied to claims 18 and 21).

The hydrophobic resin is PTFE, a fluorine-based resin (as discussed above and applied to claim 27).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 17, 18, 21, 22, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811.

In the alternative, as applied to the claimed range of 100-300nm and the prior art disclosed range of 300-600nm. While 300nm is anticipatory of the claimed range, the differences between the two claimed ranges is overall held to be slight differences which are obvious over one another as will be explained at the end of this alternative rejection.

This rejection relies upon the IPDL machine translation of JP 07-230811, a copy of which has been made of record.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the membrane electrode assembly of claims 17 and 21, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and

paragraphs 7-13). Each of the catalyst/gas diffusion configurations are applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes wherein each electrode includes the gas diffusion layer and catalyst layer as described in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12). The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers.

Regarding the heat treatment of at least 2000^{o}C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-

process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

The catalyst material is a mixture of platinum group catalyst and a carbon black support (see paragraph 12). Thus the surface of the gas diffusion layer in contact with the platinum catalyst material is also in contact with the carbon black support (as applied to claims 18 and 21).

The difference between the claims and JP '811 is the scope of the claimed diameter range (100nm-300nm in the claims compared to 300nm-600nm in JP 811).

A review of the full disclosure of the instant application reveals that acceptable diameters are from 500nm or less (see page 19, ll. 11-22). Thus there is no apparent

critical or patentable distinction for the claimed diameter range of 100-300 from diameter values as compared to diameters of up to 500nm. With this understanding, the prior art teachings in JP '811 exhibit a significant overlap with the overall recognized acceptable fiber diameters and there is no evidence of critical and unexpected results associated with the particular claimed range compared to values up to about 500nm.

Therefore the prior art teaching of fiber diameters from 300-600nm are held to be slightly different from the claimed range of 100-300nm but appreciated as acceptable diameters. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

6. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over each JP '811 rejection above as applied to claims 17 and 18 above, and further in view of U.S. patent No. 5,861,222 (Fischer).

The difference not yet discussed is of the spaces arrangements of claims 19-20.

Fischer discloses of a gas diffusion layer comprising a bimodal pore distribution and wherein the total porosity of more than 40% to less than 75% is composed of small

pores with an average diameter of up to 0.5 microns and large pores with an average diameter of 1 to 20 microns.

The motivation for providing the porosity of Fischer to the gas diffusion layer of EP '638 is that it enhances the diffusive characteristics of the gas diffusion layer while maintaining adequate mechanical strength to the layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by providing the porosity of Fischer to the gas diffusion layer of JP '811 since it would have enhanced the diffusive characteristics of the gas diffusion layer while maintained adequate mechanical strength to the layer.

7. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of the admitted prior art relied upon in the instant application, notably Fig. 1.

This rejection relies upon the IPDL machine translation of JP 07-230811, a copy of which has been made of record.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the fuel cell of claim 29, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and paragraphs 7-13). Each of the catalyst/gas diffusion configurations are applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes

wherein each electrode includes the gas diffusion layer and catalyst layer as described in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12).

Regarding the heat treatment of at least 2000°C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale

tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

Regarding the diameter of the carbon fibers:

The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, and thus clearly obviate the claimed range. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art.

In the alternative, as applied to the claimed range of 100-300nm and the prior art disclosed range of 300-600nm. While 300nm is anticipatory of the claimed range, the difference between the two claimed ranges is overall held to be slight differences which are obvious over one another.

A review of the full disclosure of the instant application reveals that acceptable diameters are from 500nm or less (see page 19, ll. 11-22). Thus there is no apparent critical or patentable distinction for the claimed diameter range of 100-300 from diameter values as compared to diameters of up to 500nm. With this understanding,

the prior art teachings in JP '811 exhibit a significant overlap with the overall recognized acceptable fiber diameters and there is no evidence of critical and unexpected results associated with the particular claimed range compared to values up to about 500nm.

Therefore the prior art teaching of fiber diameters from 300-600nm are held to be slightly different from the claimed range of 100-300nm but appreciated as acceptable diameters. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

The difference between the claimed invention and JP '811 is that JP '811 does not appear to clearly disclose of providing separators to sandwich the assembly (claim 29).

Admitted prior art Fig. 1 shows a typical fuel cell configuration wherein a solid electrolyte 4 is surrounded on each side by a catalyst layer, gas diffusion layer and separator plates each set of layers sandwiching the interior layers such that the separator plates 1 sandwich the electrode/electrolyte/electrode layers within (as applied to claim 29).

One of ordinary skill in the art would have found it obvious to employ the separator plates of Admitted prior art Fig. 1 to the fuel cell of JP '811 since it would have provided both the means to flow reactant to the gas diffusion layers in an isolated fashion and form a single cell unit.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by employing the separator plates of Admitted prior art Fig. 1 since it would have provided both the means to flow reactant to the gas diffusion layers in an isolated fashion and form a single cell unit.

8. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of U.S. Patent No 6,329,092 (Maeda).

This rejection relies upon the IPDL machine translation of JP 07-230811, a copy of which has been made of record.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the fuel cell of claims 29-30, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and paragraphs 7-13). Each of the catalyst/gas diffusion configurations are applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes wherein each electrode includes the gas diffusion layer and catalyst layer as described

in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12). The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, are anticipatory for this limit. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art.

Regarding the heat treatment of at least 2000^{o}C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is

unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

Regarding the diameter of the carbon fibers:

The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, and thus clearly obviate the claimed range. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art.

In the alternative, as applied to the claimed range of 100-300nm and the prior art disclosed range of 300-600nm. While 300nm is anticipatory of the claimed range, the difference between the two claimed ranges is overall held to be slight differences which are obvious over one another.

A review of the full disclosure of the instant application reveals that acceptable diameters are from 500nm or less (see page 19, ll. 11-22). Thus there is no apparent critical or patentable distinction for the claimed diameter range of 100-300 from diameter values as compared to diameters of up to 500nm. With this understanding, the prior art teachings in JP '811 exhibit a significant overlap with the overall recognized acceptable fiber diameters and there is no evidence of critical and unexpected results associated with the particular claimed range compared to values up to about 500nm.

Therefore the prior art teaching of fiber diameters from 300-600nm are held to be slightly different from the claimed range of 100-300nm but appreciated as acceptable diameters. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

The differences between the claimed invention and JP '811 is that JP '811 does not appear to clearly disclose of providing separators to sandwich the assembly (claim 29) and further apparently fails to teach of a fuel battery comprising at least two fuel cells layered together (claim 30).

Fig. 1 of Maeda shows a typical fuel cell configuration wherein a solid electrolyte is surrounded on each side by a catalyst layer, gas diffusion layer and separator plates 8/9 each set of layers sandwiching the interior layers such that the separator plates 8/9 sandwich the electrode/electrolyte/electrode layers within (as applied to claim 29).

One of ordinary skill in the art would have found it obvious to employ the separator plates of Maeda to the fuel cell of JP '811 since it would have provided both the means to flow reactant to the gas diffusion layers in an isolated fashion and form a single cell unit.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by employing the separator plates of Maeda since it would have provided both the means to flow reactant to the gas diffusion layers in an isolated fashion and form a single cell unit.

Each individual cell is then employed in a cell stack as shown in Fig. 2. Such stacks are known in the art so as to provide a power source of a desired voltage.

The motivation for stacking at least two cells on top of one another, as shown by Maeda is that it increases the voltage of the stack particular to the load requirement of

the system connected to the fuel cell. Thus stacking cells obviously increases the voltage output of the fuel cell power source.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by stacking at least two cells on top of one another, as shown by Maeda, since it would have increased the voltage of the stack particular to the load requirement of the system connected to the fuel cell. Thus stacking cells would have obviously increased the voltage output of the fuel cell power source.

Response to Arguments

9. Applicant's arguments filed October 20, 2008 been fully considered but they are not persuasive.

Applicant argues that the graphite whisker of JP '811 is materially different from a VGCF. This argument is moot since the rejection of JP '811 to claims 1 and 28 has been withdrawn. This argument is not germane to the remaining independent claims and their dependent claims since these claims do not recite or explicitly limit to VGCF.

Applicant now argues that JP '811 does disclose the presence of a fibrous carbon in the catalyst layer as defined in claims 17, 18, 21, 22 and 27.

This argument is not commensurate in scope with the claimed invention. The claimed invention does not recite that the fibers are in the catalyst layer, as argued, rather the claims recite that the fiber is part of the gas diffusion layer (see each independent claim). In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which

applicant relies (i.e., that the fibrous carbon is present in the catalyst layer) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Furthermore Applicant presents this allegation without any clear and convincing arguments as to how the prior art does not teach supposed features of the claims.

Thus this argument is not persuasive.

Applicant further argues that JP '811 does not exhibit the same properties as the VGCF.

This argument is moot since the rejection of JP '811 to claims 1 and 28 has been withdrawn. This argument is not germane to the remaining independent claims and their dependent claims since these claims do not recite or explicitly limit to VGCF.

Claim Rejections - 35 USC § 103

10. Claims 1 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of either JP 62-287571 (JP '571) or U.S. Patent No. 5,800,706 (Fischer) or Koyama et al. "Structure and Properties of Graphitized Carbon Fiber" (referred to as Koyama.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the fuel cell of claim 1 and the membrane electrode assembly of claim 28, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and paragraphs 7-13). Each of the catalyst/gas diffusion configurations are

applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes wherein each electrode includes the gas diffusion layer and catalyst layer as described in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12). The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, are anticipatory for this limit. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art. The mixture of the PTFE to carbon whiskers is from 5-40% by weight, preferably 10-30% by weight (see paragraph 10) such weight relationships inherently fall in the broadly claimed range of 1-95% mass.

The catalyst material is a mixture of platinum group catalyst and a carbon black support (see paragraph 12). Thus the surface of the gas diffusion layer in contact with the platinum catalyst material is also in contact with the carbon black support.

The hydrophobic resin is PTFE, a fluorine-based resin.

JP ‘811 does not teach of the graphite being VGCF.

JP '571 discloses that it is known in the art to supply fibrous carbon from a vapor phase process to a gas diffusion electrode (abstract). Fischer teaches of forming carbon fibers via pyrolysis (col. 4, ll. 40-65) and that these carbon fibers can further be subjected to graphitization (col. 4, ll. 40-65). The particular carbon fibers are exemplified as useful in gas porous electrodes (see columns 11 and 12). Koyama teaches of forming vapor grown carbon fibers, exposing the fibers to temperatures in excess of 2000^{o}C (abstract) to form graphite fibers. These fibers are described by Koyama as having the same degree of electrical resistivity as graphite whiskers (see section 3.2.1, notably page 1938, second column, paragraph beginning with "On the basis ...").

The material improves the performance and conductivity of the gas diffusion layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP ‘811 by replacing the graphite whiskers with fibrous carbon from a vapor phase process to a gas diffusion electrode as suggested by either JP ‘571 or Fischer since it would have improved the performance and conductivity of the gas diffusion layer. It would have also been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP ‘811 by replacing the graphite whiskers with fibrous carbon from a vapor phase process to a gas diffusion electrode as suggested by Koyama since they were recognized as being comparable equivalents to graphite whiskers in

exhibiting comparable electrical and mechanical properties (page 1939, conclusion of Koyama).

Response to Arguments

Applicant's arguments with respect to claims 1 and 28 have been considered but are moot in view of the new ground(s) of rejection.

The concept of substituting graphitized VGCF for graphite whiskers would have been obvious in light of the teachings of JP '571, Fischer or Koyama above. One of ordinary skill in the art would have had sufficient knowledge based on these teachings to employ graphitized VGCF as a conductive material in a gas diffusion electrode as reasoned above.

Claim Rejections - 35 USC § 103

11. Claims 17, 18, 21, 22, and 27 are additionally rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of either JP 62-287571 (JP '571) or U.S. Patent No. 5,800,706 (Fischer) or Koyama et al. "Structure and Properties of Graphitized Carbon Fiber" (referred to as Koyama.

In the alternative to the rejections set forth in items 4 and 5 above, incorporated herein (independently and for purposes of brevity) the following rejection applies.

Regarding the heat treatment of at least 2000^{o}C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art

product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

Even if it is shown that the claimed fibers are different from the graphite whiskers of JP '811, the claimed fibers are not held to be patentably distinct over the prior art of record.

JP '571 discloses that it is known in the art to supply fibrous carbon from a vapor phase process to a gas diffusion electrode (abstract). Fischer teaches of forming carbon fibers via pyrolysis (col. 4, ll. 40-65) and that these carbon fibers can further be subjected to graphitization (col. 4, ll. 40-65). The particular carbon fibers are exemplified as useful in gas porous electrodes (see columns 11 and 12). Koyama teaches of forming vapor grown carbon fibers, exposing the fibers to temperatures in excess of 2000^{o}C (abstract) to form graphite fibers. These fibers are described by Koyama as having the same degree of electrical resistivity as graphite whiskers (see section 3.2.1, notably page 1938, second column, paragraph beginning with "On the basis ...").

The material improves the performance and conductivity of the gas diffusion layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP ‘811 by replacing the graphite whiskers with fibrous carbon from a vapor phase process to a gas diffusion electrode as suggested by either JP ‘571 or Fischer since it would have improved the performance and conductivity of the gas diffusion layer. It would have also been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP ‘811 by replacing the graphite whiskers with fibrous carbon from a vapor phase process to a gas diffusion electrode as suggested by Koyama since they were recognized as being comparable equivalents to graphite whiskers in

exhibiting comparable electrical and mechanical properties (page 1939, conclusion of Koyama).

12. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of either JP '571, Fischer or Koyama above as applied to claims 17 and 18 above, and further in view of U.S. patent No. 5,861,222 (Fischer).

The difference not yet discussed is of the spaces arrangements of claims 19-20.

Fischer discloses of a gas diffusion layer comprising a bimodal pore distribution and wherein the total porosity of more than 40% to less than 75% is composed of small pores with an average diameter of up to 0.5 microns and large pores with an average diameter of 1 to 20 microns.

The motivation for providing the porosity of Fischer to the gas diffusion layer of EP '638 is that it enhances the diffusive characteristics of the gas diffusion layer while maintaining adequate mechanical strength to the layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by providing the porosity of Fischer to the gas diffusion layer of JP '811 since it would have enhanced the diffusive characteristics of the gas diffusion layer while maintained adequate mechanical strength to the layer.

13. Claim 29 is alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 view of the admitted prior art relied upon in the instant application, notably Fig. 1 and either JP '571, Fischer or Koyama.

In the alternative to the rejections set forth in item 7 above (to claim 29), incorporated herein (independently and for purposes of brevity) the following rejection applies.

Regarding the heat treatment of at least 2000°C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to

come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

Even if it is shown that the claimed fibers are different from the graphite whiskers of JP '811, the claimed fibers are not held to be patentably distinct over the prior art of record.

JP '571 discloses that it is known in the art to supply fibrous carbon from a vapor phase process to a gas diffusion electrode (abstract). Fischer teaches of forming carbon fibers via pyrolysis (col. 4, ll. 40-65) and that these carbon fibers can further be subjected to graphitization (col. 4, ll. 40-65). The particular carbon fibers are exemplified as useful in gas porous electrodes (see columns 11 and 12). Koyama teaches of forming vapor grown carbon fibers, exposing the fibers to temperatures in excess of 2000^{o}C (abstract) to form graphite fibers. These fibers are described by Koyama as having the same degree of electrical resistivity as graphite whiskers (see section 3.2.1, notably page 1938, second column, paragraph beginning with "On the basis ...").

The material improves the performance and conductivity of the gas diffusion layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP ‘811 by replacing the graphite whiskers with fibrous carbon from a vapor phase process to a gas diffusion

electrode as suggested by either JP '571 or Fischer since it would have improved the performance and conductivity of the gas diffusion layer. It would have also been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by replacing the graphite whiskers with fibrous carbon from a vapor phase process to a gas diffusion electrode as suggested by Koyama since they were recognized as being comparable equivalents to graphite whiskers in exhibiting comparable electrical and mechanical properties (page 1939, conclusion of Koyama).

14. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of U.S. Patent No 6,329,092 (Maeda) and either JP '571, Fischer or Koyama.

In the alternative to the rejections set forth in item 8 above (to claims 29 and 30), incorporated herein (independently and for purposes of brevity) the following rejection applies.

Regarding the heat treatment of at least 2000^{o}C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

Even if it is shown that the claimed fibers are different from the graphite whiskers of JP '811, the claimed fibers are not held to be patentably distinct over the prior art of record.

JP '571 discloses that it is known in the art to supply fibrous carbon from a vapor phase process to a gas diffusion electrode (abstract). Fischer teaches of forming carbon fibers via pyrolysis (col. 4, ll. 40-65) and that these carbon fibers can further be

subjected to graphitization (col. 4, ll. 40-65). The particular carbon fibers are exemplified as useful in gas porous electrodes (see columns 11 and 12). Koyama teaches of forming vapor grown carbon fibers, exposing the fibers to temperatures in excess of 2000°C (abstract) to form graphite fibers. These fibers are described by Koyama as having the same degree of electrical resistivity as graphite whiskers (see section 3.2.1, notably page 1938, second column, paragraph beginning with "On the basis ...").

The material improves the performance and conductivity of the gas diffusion layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by replacing the graphite whiskers with fibrous carbon from a vapor phase process to a gas diffusion electrode as suggested by either JP '571 or Fischer since it would have improved the performance and conductivity of the gas diffusion layer. It would have also been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by replacing the graphite whiskers with fibrous carbon from a vapor phase process to a gas diffusion electrode as suggested by Koyama since they were recognized as being comparable equivalents to graphite whiskers in exhibiting comparable electrical and mechanical properties (page 1939, conclusion of Koyama).

Response to Arguments

15. Applicant's arguments filed October 20, 2008 been fully considered but they are not persuasive.

Applicant argues that the graphite whisker of JP '811 is materially different from a VGCF. This argument is moot since the rejection of JP '811 to claims 1 and 28 has been withdrawn. This argument is not germane to the remaining independent claims and their dependent claims since these claims do not recite or explicitly limit to VGCF.

Applicant now argues that JP '811 does disclose the presence of a fibrous carbon in the catalyst layer as defined in claims 17, 18, 21, 22 and 27.

This argument is not commensurate in scope with the claimed invention. The claimed invention does not recite that the fibers are in the catalyst layer, as argued, rather the claims recite that the fiber is part of the gas diffusion layer (see each independent claim). In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., that the fibrous carbon is present in the catalyst layer) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Furthermore Applicant presents this allegation without any clear and convincing arguments as to how the prior art does not teach supposed features of the claims.

Thus this argument is not persuasive.

Applicant further argues that JP '811 does not exhibit the same properties as the VGCF.

This argument is moot since the rejection of JP '811 to claims 1 and 28 has been withdrawn. This argument is not germane to the remaining independent claims and their dependent claims since these claims do not recite or explicitly limit to VGCF.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Gregg Cantelmo/
Primary Examiner, Art Unit 1795